

# Gravity Experiment

## DROP EXPERIMENT

### Objective:

To determine whether one object will fall at a different rate than a similar object of a different shape.

### Procedure:

Drop Object A from a 50-foot height ten times and time the fall with a stop watch. Then drop Object B from the same height ten times and time the fall with a stopwatch. Compare the data to determine if there is a difference between the drop times of the two objects.

### Materials:

10 of Object A  
10 of Object B  
50-foot height  
Stopwatch

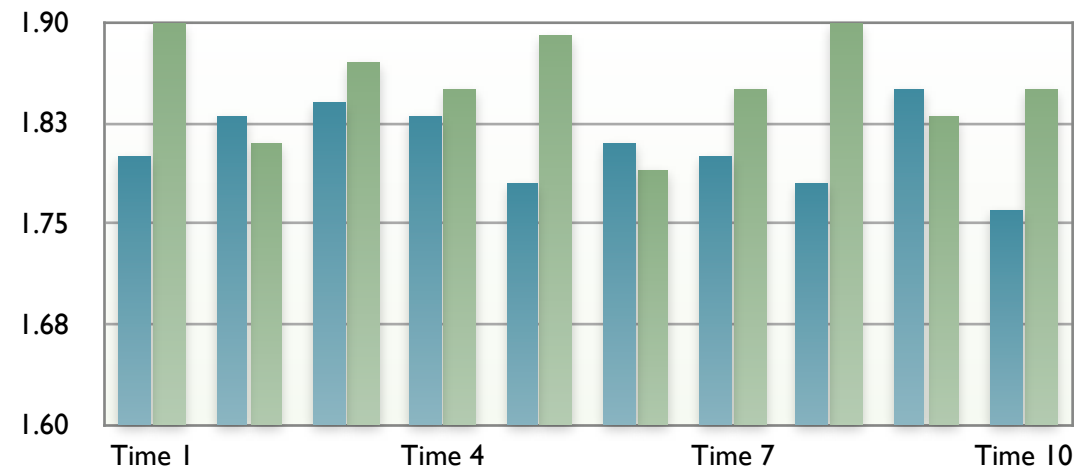
### Hypothesis:

The objects will fall at the same rate and there will be no difference in the drop times.

### Assumption:



Assume the variance of the drop times for the two objects is normally distributed.

Drop Times (Seconds)



Drop Times (Seconds)

TEST	OBJECT A	OBJECT B
Time 1	1.80	1.90
Time 2	1.83	1.81
Time 3	1.84	1.87
Time 4	1.83	1.85
Time 5	1.78	1.89
Time 6	1.81	1.79
Time 7	1.80	1.85
Time 8	1.78	1.90
Time 9	1.85	1.83
Time 10	1.76	1.85
Average	1.81	1.85

OBJECT A	OBJECT B
	
An orange weighing 160 g	A glass marble weighing 18 g

CONSTANTS	
Gravity (g)	32 feet per second <sup>2</sup> (constant)
Distance (d)	50 distance traveled in feet

# Hypothesis Testing

Calculated Statistics

	OBJECT A	OBJECT B
Count (n)	10	10
Mean	1.81	1.85
Median	1.81	1.85
Standard deviation	0.03	0.04
Variance	0.00086	0.00138
Alpha	0.05	0.05
T-value	2.26	2.26
Confidence interval	0.01820	0.02304
Upper limit	1.82620	1.87704
Lower limit	1.78980	1.83096
T-interval	0.02100	0.02659
Upper limit	1.82900	1.88059
Lower limit	1.78700	1.82741

Student Distribution

Degrees of freedom	18	
Pooled variance	0.001122	
Null hypothesis	$\mu A - \mu B =$	0.0
Alternative hypothesis	$\mu A - \mu B \neq$	0.0
T-value	2.10	
Calculated T-value	3.07	Reject Null hypothesis

Frequency Table

RANGE	OBJECT A	OBJECT B
<1.76	0	0
1.76<=x<1.80	3	1
1.80<=x<1.84	5	2
1.84<=x<1.88	2	4
>=1.88	0	3

Frequency of Drop Times

